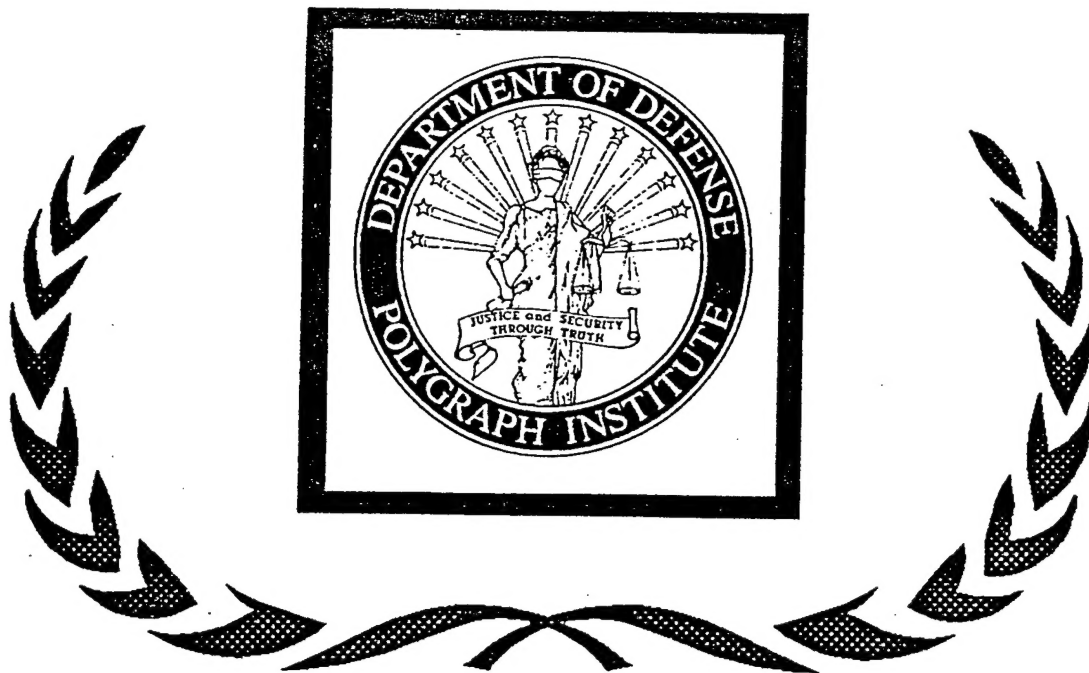


REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE October 1996	3. REPORT TYPE AND DATES COVERED Final Report (From Jul 96 - Oct 96)		
4. TITLE AND SUBTITLE Test of a Mock Theft Scenario for Use in the Psychophysiological Detection of Deception: III		5. FUNDING NUMBERS DoDPI96-P-0018		
6. AUTHOR(S) Eben M. Ingram				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Department of Defense Polygraph Institute Building 3195 Fort McClellan, AL 36205-5114		8. PERFORMING ORGANIZATION REPORT NUMBER DoDPI97-R-0003		
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Department of Defense Polygraph Institute Building 3195 Fort McClellan, AL 36205-5114		19. SPONSORING / MONITORING AGENCY REPORT NUMBER DoDPI97-R-0003 DoDPI96-P-0018		
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Public release, distribution unlimited				
13. ABSTRACT (Maximum 200 words) The Zone Comparison Test (ZCT), a psychophysiological detection of deception (PDD) test, was administered to 30 healthy male and female paid volunteers recruited by a local employment agency. The subjects were programmed to be either deceptive or non-deceptive regarding the mock theft of a valuable coin. This pilot study was designed to determine the effectiveness of the coin theft as a mock crime scenario for laboratory tests when a live pretest is used with the ZCT, with videotaped instructions and with the digitized voice presentation of test questions. PDD tests were blind-evaluated by three independent scorers using the 3-position, ZCT scoring method. The frequencies of accurate determinations were compared using proportionality tests. The overall accuracy rate was 60% when inconclusive examiner decisions were included. When inconclusive examiner decisions were excluded, the overall accuracy rate increased 87%. A significant interrater agreement among the blind scorers was found using the kappa statistic for multiple raters ( $p < .05$ ). A proportionality test indicated that the level of unanimous agreement was not significantly different from a chance level ( $p > .05$ ). It was concluded that this mock scenario did not meet the accuracy requirements for a standard scenario.				
14. SUBJECT TERMS psychophysiological detection of deception, mock crime scenario, Zone Comparison Test			15. NUMBER OF PAGES 30	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT	

19970213 001



## **Test of a Mock Theft Scenario for Use in the Psychophysiological Detection of Deception: III**

Eben M. Ingram, Ph.D.

October 1996

Department of Defense Polygraph Institute  
Fort McClellan, Alabama 36205-5114  
Telephone: 205-848-3803  
FAX: 205-848-5332

Report No. DoDPI97-R-0003

Test of a Mock Theft Scenario for Use in the Psychophysiological  
Detection of Deception: III

Eben M. Ingram, Ph.D.

October 1996

Department of Defense Polygraph Institute  
Ft. McClellan, Alabama 36205

## Director's Foreword

This report describes the third in a series of studies designed to develop laboratory tools to be used during psychophysiological detection of deception (PDD) research. In a typical deception detection laboratory study subjects participate in a procedure, usually called a mock crime, and then attempt to deceive the PDD examiner concerning their participation. The mock crime procedures used vary among reports, as do the reported accuracy rates of the subsequent PDD examinations. Differences among mock crime procedures may contribute significantly to these result differences. Use of the same, standard, mock crime procedures in multiple studies would reduce the possibility that inconsistent results among studies are due to differences among mock crime procedures. Such a standard procedure should be developed to have both validity and reliability. This report describes a third step toward development of such standard procedures. The procedure is intended exclusively for laboratory use. It is, consequently, more important that the procedure produces valid reliable decisions than it is that the procedure emulates real life situations.

A handwritten signature in cursive script, reading "Michael H. Capps".

Michael H. Capps  
Director

## Acknowledgments

The author wishes to express special thanks to the Department of Defense Polygraph Institute (DoDPI) staff who contributed their efforts toward the success of the study: Brenda Smith, Master Sergeant Randall Reynolds, and Joan Harrison-Woodard. Special thanks are also extended to Special Agent John Hendrickson of the Alcohol, Tobacco, and Firearms Bureau of the Department of the Treasury, and Special Agent Robert Cole of the Defense Investigative Service for conducting the polygraph examinations, and to DoDPI instructor Scott Manners, Special Agent Earl Taylor of the Office of the Secretary of the Air Force, and Dan Weatherman of the Air Force Office of Special Investigations for their assistance in blind scoring the psychophysiological detection of detection examinations. This research was funded by the Department of Defense Polygraph Institute, Fort McClellan, Alabama as project DoDPI96-P-0018. The views expressed in this report are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government

## Abstract

INGRAM, E. M. Test of a mock theft scenario for use in the psychophysiological detection of deception: III. October 1996, Report No. DoDPI97-R-0003, Department of Defense Polygraph Institute, Ft. McClellan, AL 36205.-- The Zone Comparison Test (ZCT), a psychophysiological detection of deception (PDD) test, was administered to 30 healthy male and female paid volunteers recruited by a local employment agency. The subjects were programmed to be either deceptive or non-deceptive regarding the mock theft of a valuable coin. This pilot study was designed to determine the effectiveness of the coin theft as a mock crime scenario for laboratory tests when a live pretest is used with the ZCT, with videotaped instructions, and with the digitized voice presentation of test questions. PDD tests were blind-evaluated by three independent scorers using the three position scale, scoring method. The frequencies of accurate determinations made were compared using proportionality tests. The overall accuracy rate was 60% when inconclusive examiner decisions were included. When inconclusive examiner decisions were excluded the overall accuracy rate increased to 87%. A significant interrater agreement among the blind scorers was found using the kappa statistic for multiple raters ( $p < .05$ ). However, a proportionality test indicated that the level of unanimous agreement was not significantly different from a chance level ( $p > .05$ ). It was concluded that this mock scenario did not meet the accuracy requirements for a standard scenario.

Key Words: psychophysiological detection of deception, mock crime scenarios, Zone Comparison Test

## Table of Contents

Title Page .....	i
Director's Foreword .....	ii
Acknowledgments .....	iii
Abstract .....	iv
List of Tables .....	vi
Introduction .....	1
Method .....	2
Subjects .....	2
Examiners .....	3
Apparatus .....	3
Design .....	4
Procedures .....	4
Data Reduction and Analysis .....	5
Results .....	5
Discussion .....	6
References .....	8
Appendix A: Description of Research .....	A-1
Appendix B: Volunteer Agreement Affidavit .....	B-1
Appendix C: Biographical/Medical Questionnaire .....	C-1
Appendix D: Written Instructions to Deceptive Subject .....	D-1
Appendix E: Written Instructions to Non-deceptive Subject .....	E-1
Appendix F: Videotaped Instructions to Subjects .....	F-1
Appendix G: Test Questions .....	G-1
Appendix H: Subject Debriefing Statement .....	H-1
Appendix I: Instructions for Subject Escort .....	I-1

## List of Tables

1. Proportions of Agreement Between Each Pair of Scorers,  
and the Proportion Correct for Each Scorer .....6
2. Decision Outcomes for Each Scorer .....6



One approach to assessing the issues pertaining to the accuracy and validity of what has been known in the past as lie detection, and is now referred to as the psychophysiological detection of deception (PDD), has been to use analog studies. These analog studies have used a variety of different mock crime scenarios (simulations of the commission of different crimes). However, since each mock scenario is unique to the study in which it is used, any differences among various analog studies can potentially be attributed to the characteristics of the mock scenarios. The Office of Technology Assessment (OTA)(1983), summarized the results of 14 studies using mock crime scenarios, and reported that there was considerable variability in the accuracy rates found by different researchers. They also reported that the percentage of subjects identified correctly in laboratory studies was over 20% lower than the percentage in field studies (61% to 82% for analog and field studies, respectively). Therefore, given these kinds of findings, it is not unusual that several researchers have in the past agreed that analog studies cannot be used to estimate the validity of the control question test (Furedy & Heslegrave, 1991; Lykken, 1981; and Iacono, 1991). Nevertheless, the analog study remains the best approach to assessing validity while criterion validity is an issue. Knowledge of "ground truth" (actual knowledge of conditions of guilt and innocence) makes analog studies superior to field studies (OTA, 1983).

This lack of extensive systematic examination of the effects of scenarios has allowed researchers in PDD to attribute the different accuracy rates found among analog studies, and between analog and field studies, to a wide variety of factors (OTA, 1983). For instance, some of these factors have been the differences in the crime situations; the differences in the testing situations; the differences in subject populations among analog studies, and most importantly, the differences in the consequences for "suspects" that exists between analog and field studies (OTA, 1983). Problems encountered in the assessment of validity when using analog and field studies have been found to be due to factors primarily associated with external validity (OTA, 1983). Consequently, since external validity refers primarily to the generalizability of results, external validity between analog studies and field studies would most likely be increased if the repeatability of analog studies increased. The repeatability of the outcomes of analog studies could be better assessed if the mock scenarios used in analog studies were standardized. The use of standard scenarios would, therefore, likely increase what Bracht and Glass (1968) refer to as ecological external validity which essentially means the representativeness of experimental findings. For PDD this means that laboratory results would be more readily generalizable, especially to the field since the treatment of subjects in different studies would be the same.

The development of standardized mock scenarios would also positively impact the development of new techniques for the detection of deception. Effective and reliable mock events are needed, since no testing approaches have been developed for use with a number of potentially new procedures and instruments (i.e., methods involving EEG, voice stress, eye-tracking, and new cardiac measures). In order to conduct credible research in the validity of PDD and to accurately assess new methods and instrumentation, an independent treatment is needed that will result in a change in a dependent measure that can actually be measured consistently. This necessitates a situation in which the behavior under observation does not change significantly from study to study because of factors unique to the scenario being used. It is also necessary that the scenario design provide sufficient experimental control to allow the

results to be interpretable. A desirable, but not absolutely necessary, characteristic of the scenario is that it maintain enough of an approximation to real life for research findings to be generalized to field settings since this is most likely the ultimate goal of the research. Therefore, developing standardized mock scenarios is a significant step toward meeting the need to generalize among analog studies, from analog studies to the field, and to provide a mechanism to assess new methods.

The research described here represents a third test of the effectiveness of a scenario involving the mock theft of a coin. The goals for the scenario are that it (a) result in high accuracy (80% or better), and (b) that the high accuracy rate be consistently repeatable. Ingram (1996) found in a previous test of the mock coin theft scenario that high accuracy could be obtained with this scenario when inconclusive calls were excluded. This study, however, had a large number of inconclusive calls (38%). Subject drowsiness was mentioned as a potential contributor to the number of inconclusives. Another concern that arose with regard to the first study was that the use of a videotaped pretest prevented the establishment of psychological set. Psychological set refers to the phenomenon whereby the PDD examinee tends to respond more to those questions that represent the greatest psychological threat (Department of Defense Polygraph Institute, 1994). Additionally, a videotaped pretest is thought to interfere with the establishment of rapport between the examiner and the examinee. The examiner must be able to monitor many behavioral factors that impact the PDD examination. To effectively monitor these behavioral factors, the examiner must be successful in establishing and maintaining rapport during the examination (Department of Defense Polygraph Institute, 1994). It is also through the establishment of rapport that the examiner induces psychological set.

Therefore, this study contains modifications to previous research done in this series of studies of the mock theft scenario. By using a live pretest rather than a videotaped pretest and conducting examinations in the morning and late afternoon, concerns regarding the type of pretest given and subject drowsiness were accommodated. During the pretest, the test questions were introduced in the following order: (a) a sacrifice relevant question, (b) the relevant questions, (c) the control questions, (d) irrelevant questions, and (e) a symptomatic question. Additionally, the questions themselves were modified by deleting any reference to the word "steal" and replacing it with the appropriate form of the word "take." All of the control questions were lie controls rather than a mix of lie and theft controls.

Consequently, the exploratory study described here was designed to determine the effectiveness of a subject programming scenario involving the mock theft of a coin in meeting the requirements necessary for this programming scenario to be useful as a standard laboratory scenario. Specifically, the study assessed the influence of a representative subject sample and a pretest given by the examiner on the accuracy of scorer decisions.

## Method

### Subjects

Thirty subjects recruited through a local temporary employment agency [mean age (SD) = 35.4 (10.14); range = 20 to 53] were randomly assigned to the programmed deceptive and the

programmed non-deceptive groups as they arrived for testing in the Department of Defense Polygraph Institute (DoDPI) library. Fifteen subjects were assigned to each group. Data from 10 male (5 assigned to guilty and 5 assigned to innocent) and 20 female (10 guilty and 10 innocent) subjects were analyzed. Sex was not considered a factor in this study because gender was not expected to play a role in the outcomes, and grouping by gender would have further reduced group sizes unnecessarily in an already small sample. Of the subjects that participated, all but 4 subjects reported themselves to be drug and medication free during the 24 hours prior to the study. Two subjects reported using antihistamines and pain killers, and 2 reported using medication for seizures during the 24 hours immediately preceding the study. All subjects reported themselves to be in good health.

### Examiners

The PDD examiners were certified PDD examiners from the Department of the Treasury, Alcohol, Tobacco and Firearms Bureau, and the Defense Investigative Service. Both examiners had approximately 10 years experience as examiners. The examiners were also trained in the use of the Axciton Polygraph system by either DoDPI, or their agency. The "blind" scorers were 3 certified PDD examiners and DoDPI instructors trained in the DoDPI's test scoring methods. The scorers were blind to the subjects' group assignment.

### Apparatus

Two Axciton Computerized Polygraph Systems (Version 7.0, Axciton Systems, Inc., Houston, TX) were used to record skin resistance, respiratory, and cardiovascular activity. The data were saved on computer disks from which paper charts were produced for scoring. The Zone Comparison Test (ZCT) (Department of Defense Polygraph Institute, 1992) was the PDD test format used to test all subjects. During PDD testing all subjects were seated in a Lafayette adjustable-arm chair (Model no. 76871, Lafayette, IN). Instructions to the subjects were recorded on videotape and presented using Sony Videocassette recorders (Model SVO-1610, Sony Electronics, Inc., San Jose, CA), and 19 inch Panasonic Video Monitors (Model CT 208VY, Panasonic Industrial Co., Norcross, GA). The item taken in the scenario was a DoDPI silver commemorative--type coin. The coin was approximately 42 mm in diameter and 2 mm thick (The coin was made by American Mint, Inc., Anniston, AL). On one side of the coin was the DoDPI emblem and on the other was the statement, "In Memory of James Hoffstein 1991." The narrator of the videotaped dialogue was recorded using a Panasonic System Camera (Model Digital 5010, Panasonic Industrial Co., Norcross, GA). The videotaped recording was made by an adult female Caucasian in front of a background consisting of a plain off-white colored wall 50 cm to the rear of the speaker. The questions presented to the subject were digitized and recorded to a computer hard disk with a Sound Blaster board (Model 16ASP, Creative Labs Inc., Milpitas, CA). An interface (designed and built in-house) connected the computer parallel port to a Radio Shack (Fort Worth, TX) integrated stereo amplifier (Model SA-155) and two Radio Shack Speakers (Model Minimus-77) which were used to present the questions. This procedure insured that each question was presented with the same inflection, tone and volume for each subject. Subjects were videotaped during the PDD examinations using a Panasonic video camera (Model WV CL 304) controlled with a Panasonic Digital audio visual mixer (Model WJAVE7). Each of the rooms used in the study was 3.5 x 3.6 m and carpeted. Each room contained a one-way, mirrored observation window. Both the examination room and the room in which the

subject watched the first video contained video monitoring equipment. All three rooms were located in the same area of the DoDPI building, and within approximately 15 meters of each other.

### Design

Subjects were tested in the morning (from 0730 to 1130 hours) and in the late afternoon (from 1500 to 1800 hours). All subjects were tested using the ZCT in an attempt to detect the difference in programming. The programmed deceptive subjects engaged in mock crime behavior which consisted of the theft of a silver commemorative coin from a room in a DoDPI building. The coin was reported to be valued at \$200. The programmed non-deceptive subjects went to the same room where the deceptive subjects found the coin, but simply filled out a 3 by 5 inch card with their names. Three blind independent scorers using the three position scale (Department of Defense Polygraph Institute, 1992), and ZCT scoring methods taught at DoDPI, scored paper charts of the tests. Each control question used in the test was provided an alternative or extended control question for use in the event that a subject answered yes to a control question during the pretest.

### Procedures

Prospective subjects were escorted to a subject briefing room. They were then provided with a copy of, and asked to read, a description of the research (see Appendix A). When the subjects completed reading this form and all appropriate questions had been answered, the escort asked each subject if he or she wished to participate in the study. Those wishing to participate were asked to read and sign a volunteer agreement affidavit. A copy of this form can be found in Appendix B. The escort then questioned the subjects sufficiently to complete a biographical and medical questionnaire (see Appendix C). When this questionnaire was completed, the subjects were escorted to room where instructions were provided. This room contained a sound-attenuated and electrically shielded chamber. A video monitor and VCR which were placed on a stand inside the chamber facing the door and situated such that the subject would immediately be aware of them when entering the room. The subject was then given an envelope and instructed to open and follow the directions in the envelope after the escort left the room. The escort then left the room. The envelope given each subject contained either written instructions for deceptive subjects (see Appendix D) or written instructions for non-deceptive subjects (see Appendix E). The instructions told the subject to: (a) read and follow instructions to perform a task in another designated room (both programmed groups had a task to perform); (b) play and view a videotape (the videotape dialogue is contained in Appendix F); and (c) upon completion of the task await the return of the escort. The other room which the subjects were instructed to enter contained a desk and two tables upon which sat several laptop computers. The Commemorative coin and a 3 by 5 inch card were placed on a table in front of the door and situated such that the appropriate items for each subject would be in the subject's line of sight when he or she first entered the room. Subjects were allowed up to 20 minutes to comply with the instructions. When the subject completed the tasks and the escort returned, the subject was taken to the PDD examination room and met by a PDD examiner. This room contained two desks, a video monitor and VCR, and the Lafayette arm chair. The room was arranged such that during the in-test the examiner sat behind a desk across from and facing the examinee. The subject's chair was located slightly to the examiner's left and facing away from and perpendicular

to the examiner. In other words the examinee could only see the examiner by turning his or her head sharply to the left. After directing the subject to be seated, the examiner began the pretest. Upon completion of the pretest, the in-test, which consisted of a ZCT, was begun. The questions used in the ZCT in-test are shown in Appendix G. The subject was videotaped during the PDD examination. When the examination was completed, the sensors were removed from the subject's body. The subject was then escorted to a waiting area (another part of DoDPI library) where the subject was required to read and sign a subject debriefing statement (see Appendix H for a copy of the debriefing statement). The instructions for the subject escort may be found in Appendix I.

#### Data Reduction and Analysis

The PDD examinations were scored independently by each of three certified PDD examiners. Their evaluation consisted of scoring the examinations using the ZCT method as taught at DoDPI (Department of Defense Polygraph Institute, 1992) and indicating the resulting decision. For each examination, there were three possible decisions: no deception indicated (NDI), deception indicated (DI), and inconclusive (INC), or non-decision. The dependent measures were the number of decisions of each type. For the accuracy assessment there was a one chance in two of correctly identifying each subject, therefore, chance was equal to 50%. For agreement assessment chance equaled 33.3% since there were three possible outcomes. Analysis included tests of proportionality.

#### Results

When INC calls were included as decisions the three PDD scorers had an overall accuracy rate of 60% (54 correct of a possible 90), an accuracy rate of 75.5% (34 correct of a possible 45) for DI decisions, and an accuracy rate of 46.6% (21 correct of a possible 45) for NDI decisions. The accuracy rate with INCs included was not significantly different from chance ( $p > .05$ ). Only the accuracy rate for DI decisions was significantly greater than a chance level ( $p < .05$ ). The rate of INC calls was 34.4% (31 INCs). When INC were not included as decisions, accuracy rates increased to 87% for the three PDD scorers, 94.4% for DI, and 77.7% for NDI decisions. The accuracy rates were significantly greater than chance for both DI and NDI decisions ( $p < .05$ ) when INCs were excluded.

Regardless of whether the decisions were correct or incorrect, the blind evaluators agreed on 46% of all decisions, 73.3% of DI decisions, 26.6% of NDI decisions, and 7% of INC decisions. The application of a method (Fleiss, 1981) for evaluating agreement when multiple decisions are possible yielded a kappa = .48, with an estimated variance = .02 ( $z = 3.59$ ,  $p < .05$ ). However, the result of a proportionality test indicates that the amount of unanimous agreement was not significantly different from a chance level ( $p < .05$ ). Chance equaled .111%. Table 1 shows the pair-wise agreement and the proportion correct for the three scorers. Table 2 shows decision outcomes for each scorer.

Table 1  
Proportions of Agreement Between Each  
Pair of Scorers, and the Proportion Correct  
for Each Scorer

Scorer	Proportion of Agreement			Correct
	1	2	3	
1	--	.633	.733	.70
2		--	.600	.59
3			--	.57

Table 2  
Decision Outcomes for Each Scorer

Scorer	Decision outcomes					
	FP	TP	FN	TN	INC/G	INC/I
1	1	11	0	10	4	4
2	1	12	0	4	3	10
3	2	11	1	6	3	7

Note. FP = false positive; TP = true positive; FN = false negative; TN = true negative; INC/G = guilty inconclusive; INC/I = innocent inconclusive.

### Discussion

The mock crime procedures used in this study failed to meet the specified 80% correct decision accuracy criterion for a PDD laboratory procedure. The procedures were, however, sufficiently effective when INC decisions are excluded. The difference in the results under the two conditions (inclusion or exclusion of INC decisions) suggests that the scenario was effective in producing a high level of discrimination when subjects responded at a level sufficiently above the instrument's sensitivity threshold to allow the scorers to make a decision. On the other hand, the number of inconclusive outcomes over 30% suggests either one, or both, of two possibilities. One possibility is that a number of examinees did not discriminate between the significance of the relevant and the control questions, and therefore, did not react differentially to the two question types. A second possibility is that the instrument's sensitivity was not sufficient to manifest responding when the magnitude of differential responding was below a certain level. A third possibility is that both of the above factors combined to impact the results.

In a previous study (Ingram, 1996), military trainees were observed to have had problems with drowsiness. Visual observations of these military subjects found that the subjects evidenced



a high degree of drowsiness behavior during PDD examinations. It was suggested that this drowsiness may have played a role in scorer accuracy (Ingram, 1996). Therefore, in the present study subjects were selected from the population of the surrounding geographical area to decrease the likelihood of subjects suffering from fatigue due to physically demanding activity such as military training. In addition, subjects were tested in the morning and late afternoon in an attempt to remove any effects due to low arousal associated with biological rhythms. Visual observations, similar to those done in the previous study, indicate that subjects did not show any behavioral evidence of drowsiness in the present study. Because of methodological differences between the two studies, it is not possible to ascertain whether the sample characteristics and/or testing times had any discernible effects on accuracy.

In light of the overall results obtained in this study, it is considered that this scenario did not meet the requirement for a standardized laboratory procedure. Despite the high accuracy rates attained when INC calls are excluded, the scenario has to be considered a failure because of the high number (31.1%) of INCs. Inconclusives indicate that the examiner failed to find sufficient scoring criteria to make a specific decision. Therefore, the INC is a non-decision and has little utility in the field except to indicate that a problem exists with the examinee, the examination procedure, or that the examination should be repeated. Consequently, INCs represent a dysfunction in some aspect of the examination process and, therefore, must be considered a negative or error aspect within the context of the scenario.

It is recommended that an additional component be introduced into the scenario, such as incentive or jeopardy. A study by Honts and Carlton (1990) showed that an incentive alone did not have an effect on accuracy. Gustafson and Orne (1963), however, reported that motivated subjects were detected at a higher rate than unmotivated subjects. By making the retention of an incentive contingent on performance, a different effect may be achieved than by an incentive alone -- the effect of producing motivated subjects. The motivating effect of jeopardy (Webster's Dictionary defines jeopardy as "exposure to loss, ...") may be achieved when a monetary incentive is combined with a performance requirement. Therefore, the purpose of this additional component is an attempt to increase the subject's differential responsivity to a level that may exceed the sensitivity threshold of the instrument and reduce the level of INCs.

## References

- Bracht, G., & Glass, G. V. (1968). The external validity of experiments. American Educational Research Journal, 5, 437.
- Department of Defense Polygraph Institute, (1992). Zone comparison test. Fort McClellan, Alabama: Author.
- Department of Defense Polygraph Institute, (1994). Pretest Interview. Fort McClellan, Alabama: Author.
- Fleiss, J. L. (1981). Statistical methods for rates and proportions (2nd ed.). New York: John Wiley & Sons.
- Furedy, J. J., & Heslegrave, R. J. (1991). The forensic use of the polygraph: A psychophysiological analysis of current trends and future prospects. In P. K. Ackles, J. R. Jennings, & M. G. H. Coles (Series Eds.), Advances in Psychophysiology: Vol. 4. (4th ed., pp. 157-189). London: Jessica Kingsley Publishers.
- Gustafson, L. A., & Orne, M. T. (1963). The effects of heightened motivation on the detection of deception. Journal of Applied Psychology, 47, 408-411.
- Honts, C. R., & Carlton, B. L. (1990). The effects of incentives on the detection of deception [Abstract]. Psychophysiology, 27, 539.
- Iacono, W. G. (1991). Can we determine the accuracy of polygraph tests? In P. K. Ackles, J. R. Jennings, & M. G. H. Coles (Series Eds.), Advances in psychophysiology: Vol.4. (4th ed., pp. 201-207). London: Jessica Kingsley Publishers.
- Ingram, E. M. (1996). Test of a mock theft scenario for use in the psychophysiological detection of deception: I. (under review).
- Lykken, D. T. (1981). A tremor in the blood: Uses and abuses of the lie detector. New York: McGraw-Hill.
- Office of Technology Assessment. (1983). Scientific validity of polygraph testing: A research review-A technical memorandum. Washington, DC: U.S. Congress, Office of Technology Assessment, OTA-TM-H-15.
- Merriam-Webster's Webster's Ninth New Collegiate Dictionary. (1990). Springfield, MA: Merriam-Webster.



## Appendix A

### Description of Research

**\*\* DODPI96-P-0018 \*\***

**WELCOME:** Welcome to the Department of Defense Polygraph Institute. This may be the first time you have participated in a research project, so we would like to provide you with some information concerning your visit today. PLEASE REMEMBER that your participation is entirely voluntary - you are free to leave at any time. If you have any questions, please feel free to ask the individuals assisting you.

**PROJECT TITLE: Test of a Mock Theft Scenario for Use in the Psychophysiological Detection of Deception: III**

**PRINCIPAL INVESTIGATOR:** Eben M. Ingram, Ph.D., Research Psychologist

**BACKGROUND/SIGNIFICANCE:** The psychophysiological detection of deception (PDD) is a process designed to determine whether an individual is responding truthfully to a series of questions. PDD is commonly called "lie detection" or "polygraph" test. The process is based on the assumption that an individual who is deceptive (i.e., lying) has a greater response in some body systems than a person who is not. While this is generally true, we are always seeking methods of improving the process.

**PURPOSE OF STUDY:** This study is designed to test the effectiveness of a subject programming scenario.

**YOU SHOULD NOT PARTICIPATE IN THIS STUDY IF ANY OF THE FOLLOWING ARE TRUE:**

- a) I am currently taking prescription medication.
- b) I have a history of dizziness or fainting spells.
- c) I have been diagnosed with a heart condition.
- d) I have been diagnosed with high blood pressure.
- e) I have been diagnosed with a respiratory ailment, such as asthma or emphysema.
- f) I currently suffer from an acute health problem such as a cold, active allergy problem, hemorrhoidal problem.
- g) I am pregnant (females only).

**PROCEDURES:** During this project you will be asked to participate in a research session lasting approximately 3 hours. You will be asked to enter a room, remove something from that room, and, possibly, to lie about what you took from the room during a PDD examination. Some people will be instructed to lie about what they took from the room and some will be asked to answer truthfully about what was taken from the room. If you are instructed to be deceptive

about what you took from the room, YOUR JOB IS TO LIE SUCCESSFULLY, to the PDD examiner concerning what you took from the room. Participation in the PDD process is relatively simple. The examiner will ask several questions concerning your age, health, and normal daily activities. A theory of the psychophysiological detection of deception will be explained and the questions you will be asked during the examination will be reviewed. The examiner will then attach sensors to your body.

**DESCRIPTION OF SENSORS USED AND THEIR ATTACHMENT:** Two metal plates will be placed on the first and third fingers of the left hand for the purpose of recording sweat gland activity. Two rubber pneumatic tubes will be attached such that they will encircle the chest and stomach. These tubes transmit changes in breathing to the computer. Finally, a blood pressure cuff will be attached to the upper arm for the purpose of recording changes in blood pressure. You will be asked to sit still for several minutes while the examiner asks the questions that were reviewed earlier. The examiner may ask the same questions several times during the examination. When the examination is finished, the sensors will be removed, you will be asked to sign a debriefing confidentiality statement, and you will be escorted out of the building. Unfortunately we will not be able to tell you the results of your examination because the data analysis and reduction process will not be completed today.

**DISCOMFORTS:** During a PDD examination, some people find it difficult to sit still for several minutes at a time while physiological reactions are recorded. The sensors used may also be uncomfortable. The examiner is sensitive to this discomfort and will attempt to make the process as brief as possible. The actual PDD tests last only a few minutes each. While you may be asked to participate in several tests, the total length of time that you will actually be participating in a polygraph examination is considerably less than the 3 hours we ask you to remain here for.

**TAPE-RECORDING:** Examinations conducted during this project may be recorded on audio or video tape using wall and ceiling mounted video cameras/microphones and commercial recorders. The recordings are made for quality control purposes and will be maintained in archives for several years, as required by law.

**RISKS:** There are no known risks involved in this study.

**CONFIDENTIALITY OF RECORDS:** You will not be asked any personal questions by the examiner, except medically related information necessary for this study. Neither your identity nor any information you reveal during this project will be released to anyone not directly involved in the research. **THE LEGAL AUTHORITY ENTITLED TO REVIEW RESEARCH RECORDS FOR ADHERENCE TO HUMAN USE REGULATIONS** is the DoDPI Human Use Committee.

**YOUR RIGHTS:** You have the right to ask questions about any aspect of your participation in the study. If problems arise at any time in conjunction with your involvement in the study you should contact Eben M. Ingram, Ph.D., (205) 848-3803/-5782, Department of Defense Polygraph Institute Fort McClellan, Al 36205. If you believe you have been injured as a result of participating in this study you should contact the Commander of the Noble Army Community Health Center, Fort McClellan, Alabama, 36205, telephone number (205) 848-2200.

**VOLUNTARY PARTICIPATION:** Your participation in this study is completely voluntary. **If you would prefer not to participate, do not volunteer for it!** Even if you decide to participate in the study, you may discontinue at any time without penalty or loss of benefits to which you are entitled. Should you decide not to participate, please inform your escort, or if it occurs during the polygraph examination itself, inform the examiner and you will be released without penalty.

**ADDITIONAL COMMENTS:** It is very important that you convince the examiner that you are being absolutely truthful during the examination. It is also VERY IMPORTANT that you do not discuss your experiences in the PDD examination with your fellow research subjects. If you discuss your experiences during the PDD examination with others you will be withdrawn from the study without further benefit.

Appendix B

Volunteer Agreement Affidavit

**\*\* DODPI96-P-0018 \*\***

Subject #: \_\_\_\_\_ Name: \_\_\_\_\_  
SSN: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ Date of Birth (Mo/Da/Yr): \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_  
Place of Birth: \_\_\_\_\_  
Home Address: \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Home Phone Number: \_\_\_\_\_

This form is affected by the Privacy Act of 1974.

**AUTHORITY:** 10 USC 3013, 44 USE 3101 and 10 USC 1071-1087, and E.O. 9397.

**PRINCIPLE PURPOSE:** To document voluntary participation in a DoD Polygraph Institute Research Program.

**ROUTINE USES:** The SSN and home address will be used for identification and locating purposes. Information derived from the study will be used to document the study, adjudication of claims, and for mandatory record keeping associated with human use in government research. Information may be furnished to Federal agencies.

**VOLUNTARY DISCLOSURE:** Failure to furnish requested information will preclude your voluntary participation in this investigational study.

PERSONAL STATEMENT

I am at least 19 years of age and do hereby volunteer to participate in a research study titled "Test of a Mock Theft Scenario for Use in the Psychophysiological Detection of Deception (DoDPI96-P-0018)," being conducted by Eben M. Ingram, Ph.D.

1. I understand that I am participating in a research study to examine several measures and techniques, some of which are currently employed in criminal and/or security screening situations where the psychophysiological detection of deception (PDD) is used. PDD is commonly called a 'polygraph test' or 'lie detection test.'

2. To the best of my knowledge, none of the following are true:

- a) I am currently taking prescription medication.
- b) I have a history of dizziness or fainting spells.

- c) I have been diagnosed with a heart condition.
  - d) I have been diagnosed with high blood pressure.
  - e) I have been diagnosed with a respiratory ailment, such as asthma or emphysema.
  - f) I currently suffer from an acute health problem such as a cold, active allergy problem, hemorrhoidal problem.
  - g) I am pregnant (females only).
3. I am aware that my participation in this study will require approximately 3 hours of my time, and that I may be asked to conceal from a trained PDD examiner information concerning my activities during this study.
4. I understand that I will be participating in a PDD examination and that I will be asked to sit still for several minutes at a time during the examination.
5. I understand that there are no known dangers or risks associated with my participation in this study.
6. Two metal plates will be placed on the first and third fingers of the left hand for the purpose of recording sweat gland activity. Two rubber pneumatic tubes will be attached such that they will encircle the chest and stomach. These tubes transmit changes in breathing to the computer. Finally, a blood pressure cuff will be attached to the upper arm for the purpose of recording changes in blood pressure.
7. I understand that my participation may be recorded on audio or video tape and that the recording will be maintained as required by law.
8. I understand that I will receive no reward or benefit of any kind beyond those I have agreed to.
9. I understand that I may terminate my involvement in this study at any time and for any reason, without penalty.
10. I understand that my participation in this project will be terminated if I discuss the details of my participation with anyone except project supervisory personnel. NOTE: Discussion of details with others could invalidate the data collection.
11. If I have any concerns or complaints regarding this study, I understand that I should contact the principal investigator, Eben M. Ingram, Ph.D., (205) 848-3803, Department of Defense Polygraph Institute Fort McClellan, AL or, Mr. Michael Capps, Director, (205) 848-3803; Department of Defense Polygraph Institute, Fort McClellan, AL.

12. I understand that any questions concerning my rights relating to study-related injury should be directed to the appropriate authority. The authority is the Commander of the Noble Army Health Center, Fort McClellan, Alabama, 36205, telephone number (205) 848-2200.

13. I have been given a thorough explanation of my role in this research project. I have been given a chance to ask any questions I have concerning the project and all questions have been answered to my full satisfaction.

---

Subject Signature

---

Witness Signature

---

Printed Name

---

Printed Name

Appendix C

Biographical/Medical Questionnaire

**\*\* DoDPI96-P-0018 \*\***

Subject number: \_\_\_\_\_ Date of completion: \_\_\_\_\_

Please carefully complete all of the blanks below:

Name (Please Print): \_\_\_\_\_ Gender: ( )M ( )F

Age: \_\_\_\_\_

Occupation: \_\_\_\_\_

Hours of sleep last night: \_\_\_\_\_

Previous PDD Examination: ( )Yes ( )No

Have you ingested alcohol, nicotine, or caffeine (including coffee, tea, soft-drinks, and chocolate) within the last 24 hours? ( )Yes ( )No

If so, what and when? \_\_\_\_\_

How would you describe your present health and physical well being?

( )Excellent ( )Good ( )Fair ( )Poor

Are you presently under a physician's care ? ( )Yes ( )No,

Are you taking any medication? ( )Yes ( )No

If so, for what condition? \_\_\_\_\_

Please identify the type, dosage, and last time any medication was taken:

Are you experiencing any pain or discomfort

today? ( )None ( )Mild ( )Moderate ( )Severe

Reason for any pain or discomfort today.

Please note reason(s), if examinee is unsuitable for testing:

## Appendix D

### Written Instructions to Deceptive Subject

**\*\* DODPI96-P-0018 \*\***

Thank you for agreeing to participate in this study. Your task today is to take a rare and valuable coin from a room across the hall, then successfully lie about taking the coin during a psychophysiological detection of deception (PDD) examination. To complete your task, you must not admit to the PDD examiner that you have seen, taken, or have possession of the coin. You must be convincing and make every attempt to hide the fact that you have taken the coin. If you do not think you can complete this task, please open the door to the room you are in and wait for your escort to return.

We require that you complete the following tasks, without assistance, in the order given.

Please:

1. Go across the hall and enter room R-103 .
2. Locate the 3" x 5" card and the small cloth bag on the table.
3. Open the cloth bag and locate the date on the coin. Return the coin to the bag. Using a pencil from the table, write your name on the 3" x 5" card.
4. Conceal both the 3" x 5" card and the cloth bag containing the coin on your person. Hide them in your pocket or somewhere else on your clothing where others cannot see them.
5. Return to the room (E-113) where you received these instructions and close the door.
6. Press the PLAY button on the video cassette player and watch the videotape. When the tape is over, press the STOP button on the video cassette player.
7. Take all of your personal property and step outside the door to meet the escort. You will not be returning to this room.



## Appendix E

### Written Instructions to Non-deceptive Subject

\*\* DODPI96-P-0018 \*\*

Thank you for agreeing to participate in this study. Your task today is to be absolutely truthful during a psychophysiological detection of deception (PDD) examination. You should not lie to the PDD examiner about anything today. You have done nothing wrong and have no knowledge of anyone else doing something wrong. Be absolutely truthful throughout the PDD examination. If you do not think you can complete this task, please open the door to the room you are in and wait for your escort to return.

We require that you complete the following tasks, without assistance, in the order given.

Please:

1. Go across the hall and enter room R-103.
2. Locate the 3" x 5" card on the table.
3. Use a pencil from the table to write your name on the 3" x 5" card.
4. Conceal the 3" x 5" card on your person. Hide it in your pocket or somewhere else on your clothing where others cannot see it.
5. Return to the room (E-113) where you received these instructions and close the door.
6. Press the PLAY button on the video cassette player and watch the videotape. When the tape is over, press the STOP button on the video cassette player.
7. Take all of your personal property and step outside the door to meet the escort. You will not be returning to this room.

## Appendix F

### Videotaped Instructions to Subjects

\*\* DoDPI96-P-0018 \*\*

Hello and welcome to the Department of Defense Polygraph Institute research project. My colleagues and I would like to thank you for taking part in this study. One of our jobs is to improve the psychophysiological detection of deception examination process. The process used to be called a polygraph or lie detector test. We now call it a psychophysiological detection of deception, or PDD for short, examination - to more precisely describe the process. You've probably seen people taking PDD examinations in movies or on television. The PDD examinations in the movies and television are usually similar to but not exactly like a real PDD examination - so don't be surprised if this process is not exactly what you expect.

One of the methods we use to test our procedures and equipment is a laboratory test. The PDD examiner actually administering the test does not know who is truthful and who is not. The entire purpose of the examination is to see if the equipment and/or examiner can determine who is truthful. We want you to assist us by convincing the examiner that you are being truthful. Thus, your job today is to convince the PDD examiner that you are telling the truth.

As you read earlier, the examiner will attach sensors to your body to measure your physiological responses. The examination questions will be about a coin which was taken from a room down the hall. The examiner doesn't know if you took the coin. I don't know if you took the coin. The escort you met earlier doesn't know if you took the coin. Only you and the person who originally filled the envelopes know who took the coin. It is VERY IMPORTANT that you do not tell anyone if you took the coin.

The PDD examiner will present the same questions to everyone. The questions concern the missing coin. The question will be presented by audiotape so that they will be the absolute same for everyone. Again, the examiner doesn't know if you took the coin. If you didn't take the coin, you will not need to lie today. Simply tell the truth during the test - that you didn't take the coin and don't know anything about it. If you took the coin, we want you to deny taking it when asked if you took it. In other words, we want you to lie about taking the coin. If you did not take the coin and you deny taking it, then you will be telling the truth. Again, your job today is to convince the examiner that you are being completely truthful -- whether you are or not.

Thank you again for your assistance with this project. When you open the door to this room someone will escort you to the PDD examination room. If you have any questions which have not been answered, please ask the escort. Due to the nature of this study the escort can answer only a limited number of questions. The escort will say "I can't answer that" if you ask something the escort is not allowed to answer.

Again, your job is to convince the PDD examiner that you are being truthful about the coin—

whether you are being truthful or not. We appreciate your assistance with this project.  
Good luck during your examination!!

Please press the stop button on the video cassette player now.

## Appendix G

### Test Questions

\*\* DODPI96-P-0018 \*\*

X The test is about to begin.

1. Are the lights on in this room?
- about 2. Regarding that missing coin, do you intend to answer truthfully each question that?
- has 3. Are you completely convinced that I will not ask you a question on this test that not already been reviewed?
4. Prior to 1996, did you ever lie to someone who trusted you?
- 4a. Other than what you told me, prior to 1996 did you ever lie to someone who trusted you?
5. Did you take that, silver coin?
6. Prior to coming to Alabama, did you ever lie to keep out of trouble?
- 6a In addition to what we discussed, did you ever lie to keep out of trouble?
7. Did you take the silver coin from room R-103?
8. Is there something else you are afraid I will ask you a question about, even though I have told you I would not?
9. Prior to this year, did you ever lie for personal gain?
- 9a Other than what we talked about, did you ever lie for personal gain?
10. Do you know where that missing silver coin is now?

XX This portion of the test is now complete, please remain still until I tell you to relax.

## Appendix H

### Subject Debriefing Statement

\*\* DODPI96-P-0018 \*\*

Now that you have completed your examination, the entire project staff sincerely thanks you for your help. Your work here may be more important than you realize.

If you participated in attempting to deceive the PDD examiner, you are assured by the project staff that you in no way violated any rule or law. The deception was required for investigational purposes only. If you actually took the coin, please return it to the escort accompanying you away from the examination room. Regardless of the role you played, it is our hope that you were made to feel as comfortable as possible throughout the study. If you do have concerns or questions regarding your participation, please make them known to the principal investigator, Eben M. Ingram, Ph.D., Research Psychologist, (205)848-3803, Department of Defense Polygraph Institute.

Finally, it is VERY IMPORTANT that you DO NOT discuss the details of this study with anyone else. One of your friends, or a friend of a friend, may decide to participate in this or a similar study someday. If they know the details of the investigation process, they could be disqualified from participating in a study and/or unconsciously influence the results of the study using their knowledge.

Please sign this form in the space provided to indicate that you understand the instructions provided above.

\_\_\_\_\_  
Subject Signature

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Date

Subject #: \_\_\_\_\_

## Appendix I

### Instructions for Subject Escort

\*\* DoDPI96-P-0018 \*\*

Inappropriate and/or non-uniform interaction with human subjects can bias and/or invalidate the results of a study. For this reason, the escort occupies one of the most sensitive and important positions in data collection. The escort should interact with all subjects in a pleasant professional manner. While it is understood that this cannot be done precisely, the escort should attempt to say the same things, at the same time, and in approximately the same manner to each subject. Every attempt should be made to interact with males, females, programmed innocent, programmed guilty, and minorities in exactly the same manner. If an escort is unsure what to do in a particular situation or cannot answer a question, the principal investigator (PI) should be contacted to resolve the issue. The escort should note that the PI was contacted to resolve the problem to ensure appropriate credit for the decision.

During this study, the escort is required to:

1. Ensure that: a) all forms are ready; b) the 3" x 5" card, and coin if necessary, are placed in the target room; c) the scenario video cassette tape is rewound and in the player; d) the scenario television and video cassette players are turned on; and e) (if specified) the subject recording devices are turned on and the media is prepared. It is the escort's responsibility to ensure that the session is recorded-as specified in the main protocol.
2. Greet subject (when subject enters building or in waiting area).
3. Introduce yourself.
4. Ask if subject needs to use toilet or would like a drink of water. If subject says yes, guide subject or give directions as appropriate.
5. Escort subject to briefing room and direct subject to sit at table/desk.
6. Direct subject to read Description of Research.
7. Answer as appropriate the subjects' questions.
8. Ask if subject wants to participate in the study. If subject doesn't wish to participate: a) inform PDD examiner; b) escort subject back to waiting area or out of building as appropriate. If subject will participate, instruct subject to complete the Volunteer Agreement Affidavit. Again, answer all of the subjects' questions.
9. Assign subject a number from list provided by principal investigator.
10. Complete the Biographical/Medical Questionnaire for the subject. Question the subject where necessary.
11. Ask if subject needs to use toilet or would like a drink of water. If subject says yes, guide subject or give directions as appropriate. Remind subject that it may be an hour or so before the next opportunity to use the toilet or drink. If subject is wearing clothing which could interfere with sensor placement, remind the subject that the examiner may request the removal of the clothing or some other accommodation for sensor placement be made.

12. Give subject the envelope containing the subject's instructions and leave the room (envelope will already have the subject's number on it).
13. Give the subject's completed Biographical/Medical Questionnaire to the PDD examiner. File the subject's completed Volunteer Agreement Affidavit.
14. Watch subject via the closed circuit television and/or the one-way mirror. If subject has obvious problems following the written instructions (e.g., doesn't leave room, does not play video tape before leaving room), inform the subject that their participation will not be permitted due to their inability to follow instructions - and escort the subject to the waiting area or out of the building. If subject has problems that are not related to following the written instructions (e.g., no writing instrument available, can't get VCR to work, missing forms), go to room and assist subject in resolving the difficulty.
15. When the subject has followed all written instructions and opened the door to the room, escort the subject to the examination room.
16. Make sure subject took the 3" x 5" card (and the coin if subject is programmed deceptive) from the target room. If the subject did not complete the 3" x 5" card or failed to take the coin when it should have been taken, contact the examiner and abort the session.
17. When the examination is over, 1) escort subject to another room, 2) obtain signature on Subject Debriefing Statement, 3) retrieve 3" x 5" card (and coin if appropriate), and 4) escort the subject out of the building or to the waiting area as appropriate.
18. Make sure all information pertaining to that subject's test are completed and filed correctly.